

Convolutional Neural Networks for Satellite Image Segmentation

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Abstract

This report highlights how a convolutional neural network was used for segmenting objects in satellite images. This project is inspired by the Kaggle DSTL satellite imagery feature detection challenge where the requirement was to build a learning machine that identify features in overhead imagery to alleviate the burdens on their image analysts.

Our solution is based on U-Net, a convolutionary neural network which we trained with satellite images of 19-spectral bands and achieved a 90% classification accuracy.

1 Introduction

1.1 Related Work

2 Satellite Imagery Dataset

2.1 Image Annotation

2.2 Imagery statistics

- Segmentation Quality:
- Object Naming:

3 U-Net Convolution Network

4 Experiments

4.1 Metrics

- Pixel Accuracy: indicates the proportion of correctly classified pixels

- Mean Accuracy: indicates the proportion of correctly classified pixels averaged over all the classes.
- Mean IoU: indicates the intersection-over-union between the predicted and ground-truth pixels, averaged over all the classes.
- Weighted IoU: indicates the IoU weighted by the total pixel ratio of each class.

5 Conclusion

6 Future Work

This material is important – part of the value of a paper is showing how the work sets new research directions. I like bullet lists here. A couple of things to keep in mind:

- We are currently extending the algorithm to use Mask-RCNN and PSPNet, and preliminary results are encouraging.
- We are exploring hand crafting a more extensive dataset using Google Earth; Gathering images at different intervals of heights above sea level e.g 200m, 500m, 1km etc and utilising a site like Amazon Turk or Appen

References

- [1] C. Brooks, E. A. Lee, X. Liu, S. Neuendorffer, Y. Zhao, and H. Zheng. Heterogeneous concurrent modeling and design in java. Technical Report Technical Memorandum UCB/ERL M04/27, University of California, July 29 2004.